Appl. No.: 10/709,677
Amdt. Dated: 7/3/2006
Reply to Office action of: 04/06/2006

AMENDMENTS TO THE DRAWINGS:

The attached sheet(s) of drawings includes changes to Figures 1 and 2. Figures 1 and 2 have been revised to incorporate numbers for all of the components shown in the drawings and to correct typographical errors in the text labels for these same components per the Examiners requirement.

Attachment: Replacement Sheet(s) - 2
Annotated Sheet(s) Showing Changes - 2

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REMARKS/ARGUMENTS

In the specification, the paragraphs 15, 16, 18 – 28, 30 – 35, 38, 39, 41, and 42 have been amended to insert the reference numbers from the drawings and to correct grammatical and typographical errors.

In amended Figures 1 and 2, have had the labels corrected and reference numbers added as suggested by the Examiner.

Claims 1 – 19 remain in this application. Claims 1 – 19 have been amended to correct grammatical and typographical errors and provide proper claim formatting.

No new matter has been introduced by these amendments.

In response to the Examiner's inquiry Applicants confirm that this application is a continuity application of PCT/ES01/00462 filed 11/27/2001 and no foreign priority is claimed.

The drawings were objected to by the Examiner because of improper labeling and lack of reference numbers. These objections are now overcome by the corrected new drawing sheets comprising Figures 1 and 2. In light of these new drawings Applicants respectfully request these objections to be removed.

The specification has been objected to by the Examiner for "...being replete with terms which are not clear, concise and exact". By this amendment the specification has been amended to remove and/or correct such terms which were not clear, concise, and exact. The Examiner has also asked how 42V can become 36V and 14V become 12V. The Applicants would point out to the Examiner that these automotive systems are designated as being 42V/14V but are used for powering loads rated at 36V/12V (see for example the explanation in Miller (US 2005/0017654 A1) at paragraph [0003] for example. The Examiner as also suggested that "FETs with sensing" is undefined, however such devices are well known, see for example Lofty et al. (US 5,850,351) with a discussion of the preferred use of FETs and heat sensing circuits. In light of these amendments to the specification, Applicants respectfully request these objections be removed.

The claims have been objected to by the Examiner for being "...replete with grammatical errors and redundant phrases, which cause the claims to be confusing and

unclear". By this amendment the claims have been revised to overcome these objections and Applicants respectfully request these objections be removed.

Claims 1 – 19 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kim (US 5,867,007), in view of Lofty (US 5,850,351), and in further view of Miller (US 2005/0017654). Specifically, the Examiner states:

> The language of claim 1 prevents a detailed limitation-specific analysis of the references listed above. As best as the examiner can interpret the language of claim 1, as discussed in the objections of claim 1, Kim and Lofty, in combination with Miller, meet the recited limitations.
>
> Kin discloses an electrical system where the voltage of the first battery is lower than the second battery, a module, and a DC/DC converter (figure 2; column 1, line 63 to column 2, line 4; column 3, lines 56 – 64). Kim discloses that the batteries are provided with an automatic disconnection device (figure 2, items 611, 612, 631, 632; column 4, lines 20 – 22). The monitoring module disclosed by Kim is listed as a "smart battery circuitry". The smart batter circuitry comprises a voltage detector (figure 2, item 300; column 4, lines 32 – 51) that compares the voltage at the posts of the batteries to a preset level. In the event that the voltage level drops below the set level, the microcontroller (figure 2, item 500) of the smart battery circuitry emits a signal to trigger the switches of the automatic disconnection device.
>
> Lofty discloses a dual battery system, where each battery contains a monitoring module (figure 1, items 11, 12; column 2, lines 30 – 32). The modules include a microcomputer, and monitor electronic characteristics of the battery (column 2, lines 47 – 49). The microcomputers of each module communicate with each other through a data network (figure 1, item 15; column 2, lines 34 – 38).
>
> Kim and Lofty are analogous because they are from the same field of endeavor, namely battery monitoring modules. Further, Kim and Lofty disclose a multiple battery electrical system, where each battery includes a microcontroller for monitoring performance characteristics of the battery.
>
> At the time of the invention by applicants, it would have been obvious to a person of ordinary skill in the art to

combine the electric source circuitry disclosed in Kim with the battery data network disclosed in Lofty.

The motivation for doing so would have been to create a battery selection circuit for devices with dual batteries.

Miller discloses a dual voltage electrical load system. The system includes high-voltage and low-voltage power sources (paragraphs 3–4) of an automobile that are connected to a generator. Miller discloses a plurality of loads (paragraph 16; figure 1, item 17–19), where each load comprises a power distribution unit (figure 1, items 14 – 16). The power distribution units maintain an average output voltage that is within the accepted range for each load.

Kim, Lofty, and Miller are analogous because they are from the same field of endeavor, namely, electronic distribution systems. Further, Miller is designed for use in a dual voltage electrical automotive system.

At the time of the invention by applicants, it would have been obvious to a person of ordinary skill in the art to combine the electric source circuitry disclosed in Kim and the data network disclosed in Lofty with the power distribution units disclosed in Miller.

The motivation for doing so would have been to create a smart circuitry that could detect the proper voltage levels at the source and distribute the power appropriately to the loads.

With respect to claim 2, Kim, Lofty and Miller disclose the system according to claim 1. Lofty further discloses that the communications network N is a dedicated network that links the microcontrollers of the power distribution units. The common data bus disclosed in Lofty is only shared among the components of the system, thereby making it a dedicated network. The communications network N is not interpreted as being limited to communications between the power distribution units, as discussed in the claim 2 objection, above.

With respect to claim 3, Kim, Lofty and Miller disclose the system according to claim 1. Lofty further discloses that the communications network N is a shared bus, such as a CAN bus, that links the microcontrollers of the power distribution units. The common data bus disclosed in Lofty is bus that is shared among the

components of the system, thereby meeting the limitations of claim 3. The communications network N is not interpreted as being limited to communications between the power distribution units, as discussed above.

With respect to claim 4, the claim is rejected as not further limiting claim 1. As discussed above, there is no disclosure I the specification that distinguishes the measurements of the State of Health (SOH) and the State of Charge (SOC) of the battery B1, as recited in claim 4, from the measurements of the sensed voltage and current of battery B1, as recited in claim 1.

With respect to claim 5, Kim, Lofty and Miller disclose the system according to claim 1, and further combine to further disclose the module SMM *based on a microcontroller or control node CN* is included in an assembly applied to the control and management of all or part of the loads fed by said battery B1. Kim and Lofty, as discussed above, disclose that battery B1 includes a module SMM for monitoring and controlling the output of the battery B1. Further, this module SMM is included in an *assembly of components,* which includes the power distribution units and loads of Miller. Therefor, the references cited above combine to disclose the limitations of claim 5.

With respect to claim 6, Kim, Lofty and Miller disclose the system according to claim 1. Miller discloses said power distribution units (10), (20), (30) to the loads (12), (22), (23), (32), (33) controlled by a microcontroller (10a), (20a), (30a), comprise a portion that supplies loads (22), (32) of said sector, at a lower voltage level, fed from battery B1, and a portion dedicated to said power loads (23), (33) included in said higher-voltage-level sector fed by said battery B2. Miller discloses that system is for use in a dual-voltage electrical automotive system (paragraph 17, lines 8 – 10). Miller also discloses that any type and any number of bulb loads may be used with the power distribution units (paragraph 16, lines 6 – 17).

It would be obvious to a person of ordinary skill in the art to adjust the power distribution units according to its associated load. Further, it would be obvious that some of the loads may require one of the high or low voltages in the dual voltage electrical automotive system. The power distribution units configured to the supply the high-voltage

loads from the high-voltage battery would inherently be in a different group than the power distribution units configured to the supply the low-voltage loads from the low-voltage battery (Miller, paragraphs 3 – 4).

With respect to claim 7, Kim, Lofty and Miller disclose the system according to claim 6. Miller further discloses said power loads (23), (33) are governed from devices such as power switches (23a), (33a) with current sensing, the power switches (23a), (33a) of which are controlled from the corresponding microcontroller (20a), (30a) of the unit (paragraph 16, lines 2 – 5). The register (13), by activating the proper power distribution unit (bulb drivers 14 – 16), of Miller can selectively apply and/or remove power from each of the loads. It is obvious in the disclosure of Miller that the on/off signal transmitted by the power distribution units would activate a switch within the bulb to execute the command.

With respect to claim 8, Kim Lofty and Miller disclose the system according to claim 7, and further, it would have been obvious to use a field effect transistor (FET) as the switch. It is well known in the art to use FETs as switching devices.

With respect to claim 9, Kim, Lofty and Miller disclose the system according to claim 1. Lofty discloses each one of said batteries B1 and B2 is provided with a *moduleSMM basedon* a microcontroller for controlling at least a disconnection device (SDB) of said batteries (column 2, lines 30 – 32 and 47 – 62).

With respect to claim 10, Kim, Lofty and Miller disclose the system according to claim 7. Miller discloses said power distribution units (10), (20), (30) *comprise a connection* of each one of said power switches (23a), (33a) to said microcontroller (20a), (30a) of the corresponding unit (20, 30) *for a prior sensing* of the voltage or impedance at the output of said power switches (23a), (33a) prior to connecting the controlled load (23), (33), allowing avoidance of said connection if *saidvalues* are outside of somepredeterminedmargins(paragraph16).Miller discloses that the power distribution units can activate the loads to optimize low-peak currents (lines 10 – 15). It is obvious that the power distribution units would access the operability of each load prior to activating the load. The PDUs would do so in order to prevent a load operating

> outside of an acceptable margin from overloading the system.
>
> Claims 11 – 19 are rejected because the apparatus necessary to accomplish the method disclosed has been rejected in claims 1 – 10, as discussed above.

Applicant respectfully traverses this rejection. The key to Applicants' invention is a distributed power management apparatus and method that utilizes at least one lower voltage battery and one higher voltage battery in cooperative combination with a DC/DC converter and multiple controllers associated with load sectors controlled by a module SMM microcontroller to provide protection against short-circuits which cause high voltage conditions and potential for damage to the electrical system, the loads, and the possibility of fire.

A fair reading of the Kim (US 5,867,007) reference discloses distributed management apparatus to provide a selection circuit to identify and regulate a pair of same low voltage batteries, namely 5V battery packs, suitable for use in powering electronic devices such as laptop computers (see for example, Col 2, lines 35 –39 and 43 – 64). This reference does not disclose, teach, or fair suggest a distributed management apparatus that is suitable for use in a 42(36)V/14(12)V system having at least one lower voltage battery 12V and one higher voltage battery 36V. It also does not teach how to allow the higher voltage battery 36V to feed the lower voltage 12V loads if necessary. It further does not disclose, teach, or fairly suggest the use of a DC/DC converter in the taught distributed management apparatus and in fact such teaching is unwarranted as the batteries of the reference are of the same voltage 5V. Still further, it is designed to operate to identify low voltage or voltage drop, not increased voltage due to short-circuit (see for example, Col. 3, lines 1 – 5). Finally, this reference does not disclose, teach, or fairly suggest how to incorporate the management of a power generator into the system. Clearly, when viewed in this light this rejection is now moot and Applicant respectfully requests this rejection be removed.

A fair reading of the Lofty (US 5,850,351) reference discloses a distributed management apparatus for multiple cells low voltage battery packs so that all of the cells in the battery pack may be recharged optimally without damage to cells that charge at a faster rate than other cells in the battery pack (see for example, Col. 2, lines 31 – 62). As in the Kim reference, all of the cells (batteries) in a battery pack are of the same low voltage rating (see for example, Col. 1, lines 9 – 11, and Col. 2, lines 30 – 32). Further,

this reference teaches the need for a separate battery to operate the claimed apparatus (see for example, Col. 2, lines 31 – 33). The Lofty reference does not disclose, teach, or fairly suggest the use of batteries having very different voltage outputs such as claimed by Applicants. This reference also does not teach the how to power lower voltage loads with a higher voltage battery if required, the use of a DC/DC converter to lower the voltage of a higher voltage battery to the voltage level of a lower voltage battery, or how to incorporate a power generator into the apparatus. Clearly, when viewed in this light this rejection is now moot and Applicant respectfully requests this rejection be removed.

A fair reading of the Miller (US 2005/0017654) reference discloses a single higher voltage battery (42/36V) suitable for powering both higher voltage (36V) loads as well as lower voltage (12V) loads (see for example paragraph [0014]). It discloses, teaches, and fairly suggests that using at least two batteries of different voltage outputs (see for example, paragraph [0003], and using a DC/DC converter (see for example, paragraph [0006]) is not suitable. That is, this reference teaches directly away from Applicants' claimed invention. Further, this teaching is one of using a power generator in the apparatus which is completely unsuitable for combining with the Kim or Lofty references. Clearly, this reference is not combinable with the Kim or Lofty references teaching low voltage 5V battery chargers or multiple like low voltage battery use for electronic devices. All three references lack the legally necessary impetus within any of the cited references to suggest to one of ordinary skill in the art the desirability of combining the teachings of these references to arrive at Applicants' claimed invention. In fact, the Miller reference teaches directly away from Applicants' claimed invention. Thus, these references are not combinable as suggested by the Examiner and even if they were combinable do not disclose, teach, or suggest Applicant's claimed invention. Clearly, when viewed in this light this rejection is now moot and Applicant respectfully requests this rejection be removed.

In view of the remarks herein, and the amendments hereto, it is submitted that this application is in condition for allowance, and such action and issuance of a timely Notice of Allowance is respectfully solicited.

Respectfully submitted,

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Attachments

Appl. No. 10/709,677
Amd. Dated July 3, 2006
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Annotated Sheet Showing Changes

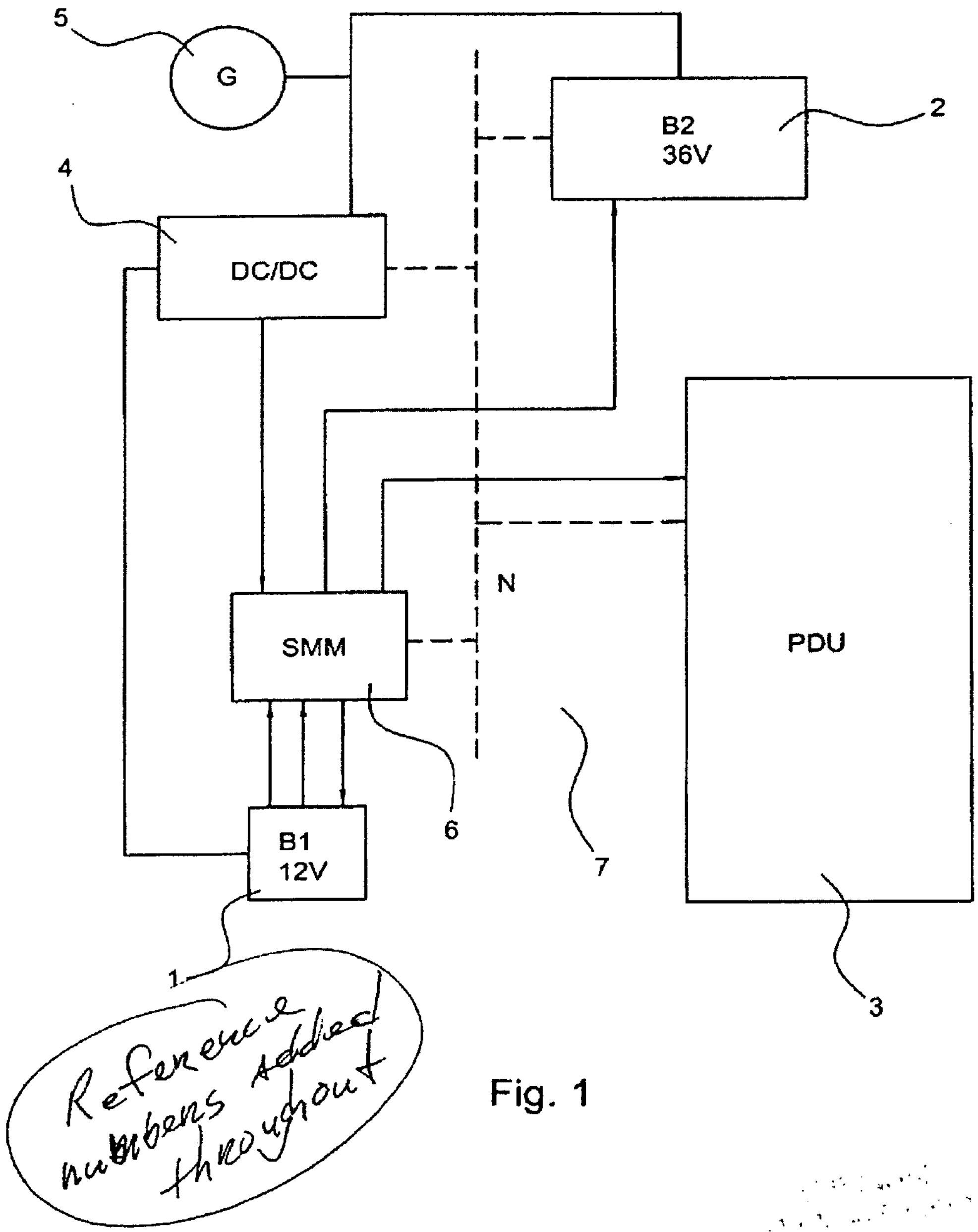

Fig. 1

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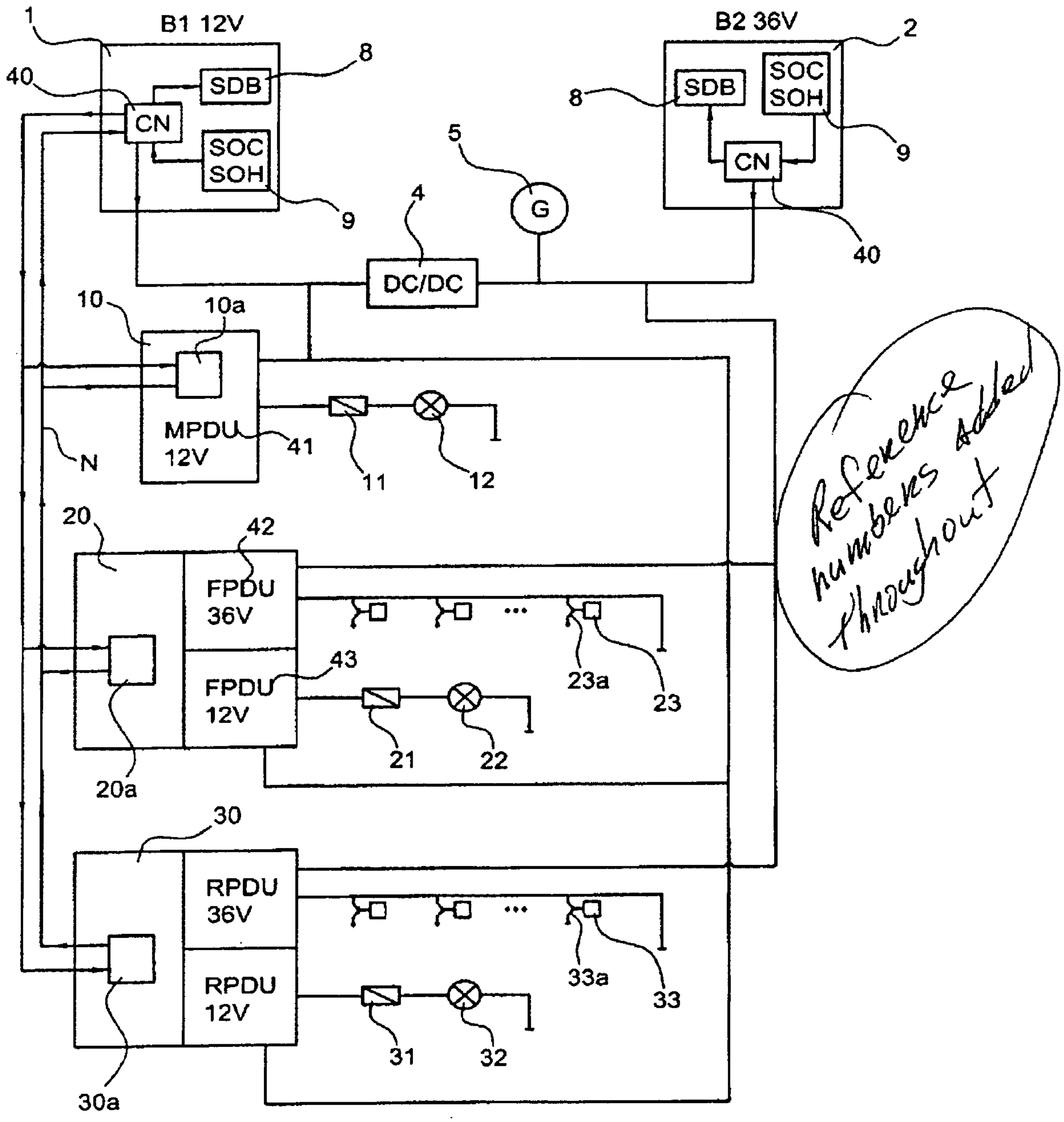

Fig. 2